



PORTLAND HARBOR RI/FS
**ROUND 2A SUBSURFACE SEDIMENT
FIELD SAMPLING REPORT**

APPENDIX A

Natural Attenuation Evaluation Field Sampling Report

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January 10, 2005



PORTLAND HARBOR RI/FS

APPENDIX A:

NATURAL ATTENUATION EVALUATION

FIELD SAMPLING REPORT

DRAFT

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January 10, 2004

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LIST OF ACRONYMS

FSP	Field Sampling Plan
FSR	Field Sampling Report
LOER	Texas A&M University Laboratory for Oceanographic and Environmental Research
NAFSP	Natural Attenuation Technical Memorandum–Sedimentation Field Sampling Plan
QAPP	Quality Assurance Project Plan

1.0 INTRODUCTION

Four stations were sampled to collect information in support of the evaluation of natural attenuation processes (i.e., sedimentation) for the Portland Harbor Remedial Investigation/Feasibility Study (RI/FS). These sampling locations were selected because they appear to have net sedimentation based on existing information. The locations sampled are specified in the Final Natural Attenuation Technical Memorandum – Sedimentation Field Sampling Plan (hereafter referred to as the NAFSP; Anchor and Texas A&M 2004). The purpose of this field sampling report is to describe the field procedures used to collect and process the cores for the natural attenuation study.

2.0 SAMPLE PROCESSING AND HANDLING PROCEDURES

Sediment cores for analysis of radioisotopes, physical and chemical parameters were collected at the four stations described in the NAFSP. This section includes the procedures used for sampling, processing, and analysis of these core samples.

2.1 SAMPLE COLLECTION

The natural attenuation coring was conducted on October 20 and 21, 2004 using coring equipment and procedures identical to those described for the much larger Round 2 sediment sampling event that is described in the Portland Harbor RI/FS Round 2 Field Sampling Plan (FSP) for Sediment Sampling and Benthic Toxicity Testing (hereafter referred to as the Round 2 Sediment FSP; Integral et al. 2004). Consequently, many of the procedures discussed in the Round 2 Sediment FSP and associated Round 2 Quality Assurance Project Plan (QAPP; Integral and Windward 2004) are incorporated here by reference.

Sample collection followed the procedures described in the Round 2 Sediment FSP and in the Field Sampling Report (FSR) including specifics relating to:

- Sampling vessels used
- Station positioning and vertical control
- Field logbooks and forms
- Equipment and supplies
- Equipment decontamination procedures
- Field quality assurance/quality control procedures (where applicable to natural attenuation coring)
- Subsurface sediment core collection procedures
- Waste disposal
- Sample handling and transport

At each sampling location depicted in Figure 2-1 of the Round 2 FSR, two cores were taken. These cores were taken as close together as possible, while ensuring that the sediments disturbed by one core were not sampled by the second core. The first core was used for radioisotope analyses, and was termed the “radioisotope core.” The second core was sampled for ancillary information on sediment bulk chemistry and physical characteristics, and was termed the “ancillary core.” Field log forms from the core collection are contained in Appendix B of the Round 2 FSR.

The cores (in intact sections) were provided to Anchor for onshore processing (e.g., splitting and subsampling of cores) and delivery of samples to the laboratories. Cores were precut into manageable sections on the boat approximately 3.5 to 4 ft in length. Core sections were kept refrigerated at 4°C until processing. All core sections other than the uppermost section have been archived intact in freezers. Samples were identified using the nomenclature outlined in the NAFSP.

Deviations from the Round 2 FSP and NAFSP are discussed in Section 2.4.

2.2 RADIOISOTOPE CORE PROCESSING

The first core collected at a given location was sectioned for radioisotope analyses. Core processing occurred on October 20, 21 and 22, 2004. The procedures for processing each core were as follows:

1. The upper 3.5 feet (approximately 112 cm) core interval collected was cut open lengthwise and photographed. Photographs of the cores are located in FSR Appendix D–Core Photographs.
2. Physical descriptions of the core were logged on a core profile form (FSR Appendix C–Core Description Forms).
3. One half of the split core was sampled for $^7\text{Be}/^{137}\text{Cs}$ analyses and the other half for ^{210}Pb /bulk metals analyses (Figure A-1). Sample intervals were isolated by inserting decontaminated plastic disks prior to sample collection.
4. Samples for ^{210}Pb /bulk metals analyses were homogenized and then split equally between two jars, one for ^{210}Pb analysis by Texas A&M University Laboratory for Oceanographic and Environmental Research (LOER) and one for bulk metals analysis at the standard laboratory as specified in the Round 2 FSP.
5. Samples for $^7\text{Be}/^{137}\text{Cs}$ analyses were sampled directly from the core section into a single prelabeled jar.
6. The core remaining below 94 cm (to approximately 112 cm or 3.5 feet) was archived in a 32-oz jar.
7. Sample IDs were recorded onto chain-of-custody forms and kept on ice until delivery to the lab. Sample IDs are listed in Table A-1 along with analyses required for each sample.

2.3 ANCILLARY CORE PROCESSING

Similar to the radioisotope analyses, ancillary core processing was conducted only on the upper 94 cm of sediment. The procedures used are as follows:

1. After the core was split open, VOC and gasoline samples were immediately taken, then the core was photographed (FSR Appendix D–Core Photographs).
2. Up to three major sediment strata per core were noted for bulk organic chemistry and conventional analyses.
3. Prior to sampling of strata for remaining laboratory analytes, pH and Eh were measured in each strata and immediately on either side of any visually apparent surface redox boundary using field probes.
4. Each strata to be sampled was then removed and homogenized in a bowl. Once the sample was homogenized, jars for other organic chemical and conventional sediment analyses were filled.
5. Portions below 94 cm within the split core were archived into a jar (i.e., from 94 cm to 112 cm or 3.5 feet).
6. Samples were submitted to the standard laboratory for analysis according to the Round 2 FSP and are included in Table 3-2 of the Round 2 FSR.

2.4 DEVIATIONS FROM THE ROUND 2 FSP AND NAFSP

All radioisotope cores were processed, sampled, and submitted for analysis according to the procedures outlined in the NAFSP.

The ancillary core from station NA-4 was initially incorrectly labeled by boat staff as NA-4D1, instead of NA-4B, this was not corrected until after the core was split and photographed. Therefore the photographs of this core are labeled with the improper core name.

Ancillary core NA-1B was not measured for pH/Eh before homogenization and jarring due to oversight by field staff.

Some cores contained very loose material in the top portion of the core, which upon being laid horizontal for processing, would slide to create a beveled top rather than a flat top. To recreate the flat top necessary for processing the small intervals in the radioisotope cores, a plastic separation disk would be used to gently push and hold the material back in its original position. On core NA-4A, processed for radioisotope analysis, the top was unconsolidated. When the above method was used it resulted in the top being shifted 14 cm lower than initially noted.

3.0 REFERENCES

Anchor Environmental LLC and Texas A&M University. 2004. Portland Harbor RI/FS Final Natural Attenuation Technical Memorandum–Sedimentation Field Sampling Plan. Anchor Environmental, L.L.C., Seattle, WA.

Integral and Windward Environmental. 2004. Portland Harbor RI/FS Round 2 Quality Assurance Project Plan. Prepared for the Lower Willamette Group, Portland, OR. Integral Consulting, Inc., Mercer Island, WA.

Integral, Anchor Environmental, and Windward. 2004. Portland Harbor RI/FS Round 2 Field Sampling Plan, Sediment Sampling and Benthic Toxicity Testing. Prepared for Lower Willamette Group, Portland, OR. Integral Consulting, Mercer Island, WA

Figure A-1. Natural Attenuation Core Sampling Schematic.

Sample Depth (cm)		⁷ Be/ ¹³⁷ Cs	²¹⁰ Pb/ Metals
top	bottom		
0	0.5	1	1
0.5	1	1	
1	1.5	1	
1.5	2	1	
2	3	1	
3	4	1	
4	5	1	
5	6	1	1
6	7	1	
7	8	1	
8	9	1	1
9	10	1	
10	12	1	
12	14	1	1
14	16		
16	18	1	1
18	20		
20	22	1	1
22	24		
24	26	1	1
26	28		
28	30	1	1
30	32		
32	34	Archive	1
34	36		
36	38		
38	40	Archive	1
40	42		
42	44		
44	46	Archive	Archive
46	48		
48	50	Archive	1
50	52		
52	54		
54	56	Archive	Archive
56	58		
58	60	Archive	1
60	62		
62	64		
64	66	Archive	Archive
66	68		
68	70		
70	72	Archive	1
72	74		
74	76		
76	78	Archive	Archive
78	80		
80	82		
82	84	Archive	1
84	86		
86	88		
88	90	Archive	1
90	92		
92	94		
94	440	Archive	Archive

1 the depths within each box will be composited to make one sample

Table A-1. Radioisotope Analyses for Natural Attenuation Cores

Date Sampled	Sample ID	⁷ Be	¹³⁷ Cs	²¹⁰ Pb	Metals	Archive
10/20/04	NA-1A-0005			X	X	
10/20/04	NA-1A-0508			X	X	
10/20/04	NA-1A-0812			X	X	
10/20/04	NA-1A-1216			X	X	
10/20/04	NA-1A-1620			X	X	
10/20/04	NA-1A-2024			X	X	
10/20/04	NA-1A-2428			X	X	
10/20/04	NA-1A-2832			X	X	
10/20/04	NA-1A-3238			X	X	
10/20/04	NA-1A-3844			X	X	
10/20/04	NA-1A-4448					X
10/20/04	NA-1A-4854			X	X	
10/20/04	NA-1A-5458					X
10/20/04	NA-1A-5864			X	X	
10/20/04	NA-1A-6468					X
10/20/04	NA-1A-6874			X	X	
10/20/04	NA-1A-7478					X
10/20/04	NA-1A-7884			X	X	
10/20/04	NA-1A-8488					X
10/20/04	NA-1A-8894			X	X	
10/20/04	NA-1A-0000.5	X	X			
10/20/04	NA-1A-00.501	X	X			
10/20/04	NA-1A-0101.5	X	X			
10/20/04	NA-1A-01.502	X	X			
10/20/04	NA-1A-0203	X	X			
10/20/04	NA-1A-0304	X	X			
10/20/04	NA-1A-0405	X	X			
10/20/04	NA-1A-0506	X	X			
10/20/04	NA-1A-0607	X	X			
10/20/04	NA-1A-0708	X	X			
10/20/04	NA-1A-0809	X	X			
10/20/04	NA-1A-0910	X	X			
10/20/04	NA-1A-1012	X	X			
10/20/04	NA-1A-1216	X	X			
10/20/04	NA-1A-1620	X	X			
10/20/04	NA-1A-2024	X	X			

Table A-1. Radioisotope Analyses for Natural Attenuation Cores

Date Sampled	Sample ID	⁷ Be	¹³⁷ Cs	²¹⁰ Pb	Metals	Archive
10/20/04	NA-1A-2428	X	X			
10/20/04	NA-1A-2832	X	X			
10/20/04	NA-1A-3238					X
10/20/04	NA-1A-3844					X
10/20/04	NA-1A-4448					X
10/20/04	NA-1A-4854					X
10/20/04	NA-1A-5458					X
10/20/04	NA-1A-5864					X
10/20/04	NA-1A-6470					X
10/20/04	NA-1A-7076					X
10/20/04	NA-1A-7682					X
10/20/04	NA-1A-8288					X
10/20/04	NA-1A-8894					X
10/21/04	NA-2A-0005			X	X	
10/21/04	NA-2A-0508			X	X	
10/21/04	NA-2A-0812			X	X	
10/21/04	NA-2A-1216			X	X	
10/21/04	NA-2A-1620			X	X	
10/21/04	NA-2A-2024			X	X	
10/21/04	NA-2A-2428			X	X	
10/21/04	NA-2A-2832			X	X	
10/21/04	NA-2A-3238			X	X	
10/21/04	NA-2A-3844			X	X	
10/21/04	NA-2A-4448					X
10/21/04	NA-2A-4854			X	X	
10/21/04	NA-2A-5458					X
10/21/04	NA-2A-5864			X	X	
10/21/04	NA-2A-6468					X
10/21/04	NA-2A-6874			X	X	
10/21/04	NA-2A-7478					X
10/21/04	NA-2A-7884			X	X	
10/21/04	NA-2A-8488					X
10/21/04	NA-2A-8894			X	X	
10/21/04	NA-2A-0000.5	X	X			
10/21/04	NA-2A-00.501	X	X			
10/21/04	NA-2A-0101.5	X	X			

Table A-1. Radioisotope Analyses for Natural Attenuation Cores

Date Sampled	Sample ID	⁷ Be	¹³⁷ Cs	²¹⁰ Pb	Metals	Archive
10/21/04	NA-2A-01.502	X	X			
10/21/04	NA-2A-0203	X	X			
10/21/04	NA-2A-0304	X	X			
10/21/04	NA-2A-0405	X	X			
10/21/04	NA-2A-0506	X	X			
10/21/04	NA-2A-0607	X	X			
10/21/04	NA-2A-0708	X	X			
10/21/04	NA-2A-0809	X	X			
10/21/04	NA-2A-0910	X	X			
10/21/04	NA-2A-1012	X	X			
10/21/04	NA-2A-1216	X	X			
10/21/04	NA-2A-1620	X	X			
10/21/04	NA-2A-2024	X	X			
10/21/04	NA-2A-2428	X	X			
10/21/04	NA-2A-2832	X	X			
10/21/04	NA-2A-3238					X
10/21/04	NA-2A-3844					X
10/21/04	NA-2A-4448					X
10/21/04	NA-2A-4854					X
10/21/04	NA-2A-5458					X
10/21/04	NA-2A-5864					X
10/21/04	NA-2A-6470					X
10/21/04	NA-2A-7076					X
10/21/04	NA-2A-7682					X
10/21/04	NA-2A-8288					X
10/21/04	NA-2A-8894					X
10/21/04	NA-2A-94112					X
10/22/04	NA-3A-0005			X	X	
10/22/04	NA-3A-0508			X	X	
10/22/04	NA-3A-0812			X	X	
10/22/04	NA-3A-1216			X	X	
10/22/04	NA-3A-1620			X	X	
10/22/04	NA-3A-2024			X	X	
10/22/04	NA-3A-2428			X	X	
10/22/04	NA-3A-2832			X	X	
10/22/04	NA-3A-3238			X	X	

Table A-1. Radioisotope Analyses for Natural Attenuation Cores

Date Sampled	Sample ID	⁷ Be	¹³⁷ Cs	²¹⁰ Pb	Metals	Archive
10/22/04	NA-3A-3844			X	X	
10/22/04	NA-3A-4448					X
10/22/04	NA-3A-4854			X	X	
10/22/04	NA-3A-5458					X
10/22/04	NA-3A-5864			X	X	
10/22/04	NA-3A-6468					X
10/22/04	NA-3A-6874			X	X	
10/22/04	NA-3A-7478					X
10/22/04	NA-3A-7884			X	X	
10/22/04	NA-3A-8488					X
10/22/04	NA-3A-8894			X	X	
10/22/04	NA-3A-0000.5	X	X			
10/22/04	NA-3A-00.501	X	X			
10/22/04	NA-3A-0101.5	X	X			
10/22/04	NA-3A-01.502	X	X			
10/22/04	NA-3A-0203	X	X			
10/22/04	NA-3A-0304	X	X			
10/22/04	NA-3A-0405	X	X			
10/22/04	NA-3A-0506	X	X			
10/22/04	NA-3A-0607	X	X			
10/22/04	NA-3A-0708	X	X			
10/22/04	NA-3A-0809	X	X			
10/22/04	NA-3A-0910	X	X			
10/22/04	NA-3A-1012	X	X			
10/22/04	NA-3A-1216	X	X			
10/22/04	NA-3A-1620	X	X			
10/22/04	NA-3A-2024	X	X			
10/22/04	NA-3A-2428	X	X			
10/22/04	NA-3A-2832	X	X			
10/22/04	NA-3A-3238					X
10/22/04	NA-3A-3844					X
10/22/04	NA-3A-4448					X
10/22/04	NA-3A-4854					X
10/22/04	NA-3A-5458					X
10/22/04	NA-3A-5864					X
10/22/04	NA-3A-6470					X

Table A-1. Radioisotope Analyses for Natural Attenuation Cores

Date Sampled	Sample ID	⁷ Be	¹³⁷ Cs	²¹⁰ Pb	Metals	Archive
10/22/04	NA-3A-7076					X
10/22/04	NA-3A-7682					X
10/22/04	NA-3A-8288					X
10/22/04	NA-3A-8894					X
10/22/04	NA-3A-9498					X
10/21/04	NA-4A-0005			X	X	
10/21/04	NA-4A-0508			X	X	
10/21/04	NA-4A-0812			X	X	
10/21/04	NA-4A-1216			X	X	
10/21/04	NA-4A-1620			X	X	
10/21/04	NA-4A-2024			X	X	
10/21/04	NA-4A-2428			X	X	
10/21/04	NA-4A-2832			X	X	
10/21/04	NA-4A-3238			X	X	
10/21/04	NA-4A-3844			X	X	
10/21/04	NA-4A-4448					X
10/21/04	NA-4A-4854			X	X	
10/21/04	NA-4A-5458					X
10/21/04	NA-4A-5864			X	X	
10/21/04	NA-4A-6468					X
10/21/04	NA-4A-6874			X	X	
10/21/04	NA-4A-7478					X
10/21/04	NA-4A-7884			X	X	
10/21/04	NA-4A-8488					X
10/21/04	NA-4A-8894			X	X	
10/21/04	NA-4A-0000.5	X	X			
10/21/04	NA-4A-00.501	X	X			
10/21/04	NA-4A-0101.5	X	X			
10/21/04	NA-4A-01.502	X	X			
10/21/04	NA-4A-0203	X	X			
10/21/04	NA-4A-0304	X	X			
10/21/04	NA-4A-0405	X	X			
10/21/04	NA-4A-0506	X	X			
10/21/04	NA-4A-0607	X	X			
10/21/04	NA-4A-0708	X	X			
10/21/04	NA-4A-0809	X	X			

Table A-1. Radioisotope Analyses for Natural Attenuation Cores

Date Sampled	Sample ID	⁷ Be	¹³⁷ Cs	²¹⁰ Pb	Metals	Archive
10/21/04	NA-4A-0910	X	X			
10/21/04	NA-4A-1012	X	X			
10/21/04	NA-4A-1216	X	X			
10/21/04	NA-4A-1620	X	X			
10/21/04	NA-4A-2024	X	X			
10/21/04	NA-4A-2428	X	X			
10/21/04	NA-4A-2832	X	X			
10/21/04	NA-4A-3238					X
10/21/04	NA-4A-3844					X
10/21/04	NA-4A-4448					X
10/21/04	NA-4A-4854					X
10/21/04	NA-4A-5458					X
10/21/04	NA-4A-5864					X
10/21/04	NA-4A-6470					X
10/21/04	NA-4A-7076					X
10/21/04	NA-4A-7682					X
10/21/04	NA-4A-8288					X
10/21/04	NA-4A-8894					X
10/21/04	NA-4A-94101					X